WHAT IS CLAIMED IS:

Sub A1

1. A method of oxidizing a phosphite ester linkage in a nucleic acid array to a phosphate linkage, comprising contacting said phosphite ester linkage with a solution of from about 0.005 M to about 0.05 M iodine in a mixture of water and organic solvent.

2. A method of preparing a nucleic acid array on a support, wherein each nucleic acid occupies a separate known region of the support, said synthesizing comprising:

(a) activating a region of the support;

(b) attaching a nucleotide to a first region, said nucleotide having a masked reactive site linked to a protecting group;

(c) repeating steps (a) and (b) on other regions of said support whereby each of said other regions has bound thereto another nucleotide comprising a masked reactive site link to a protecting group, wherein said another nucleotide may be the same or different from that used in step (b);

(d) removing the protecting group from one of the nucleotides bound to one of the regions of the support to provide a region bearing a nucleotide having an unmasked reactive site;

(e) binding an additional nucleotide to the nucleotide with an unmasked reactive site;

(f) repeating steps (d) and (e) on regions of the support until a desired pluarlity of nucleic acids is synthesized, each nucleic acid occupying separate known regions of the support;

wherein said attaching and said binding are each made by covalently forming a phosphite triester linkage between said nucleotides and said unmasked reactive site and further comprising oxidizing said phosphite triester linkage to a phosphate triester linkage with a solution of from about 0.005 M to about 0.05 M iodine in an aqueous solvent mixture.

3. A method in accordance with claim **2**, wherein said synthesizing comprises the sequential steps of:

a) removing a photoremoveable protecting group from at least a first area of a surface of a substrate, said surface comprising immobilized nucleotides on said

surface, said nucleotides capped with a photoremovable protective group, without removing a photoremoveable protecting group from at least a second area of said surface;

b) simultaneously contacting said first area and said second area of said surface with a first nucleotide to couple said first nucleotide to said immobilized nucleotides in said first area, and not in said second area, said first nucleotide capped with said photoremovable protective group;

c) removing a photoremoveable protecting group from at least a part of said first area of said surface and at least a part of said second area;

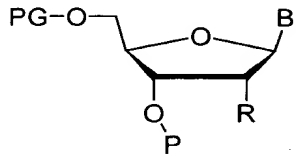
d) simultaneously contacting said first area and said second area of said surface with a second nucleotide to couple said second nucleotide to said immobilized nucleotides in at least a part of said first area and at least a part of said second area;

e) performing additional irradiating and nucleotide contacting and coupling steps so that a matrix array of at least 100 nucleic acids having different sequences is formed on said support;

with the proviso that the coupling steps further comprise oxidizing an initially formed phosphite ester linkage to a phosphate ester linkage using from about 0.005 M to about 0.05 M iodine in an aqueous solvent mixture.

4. A method in accordance with claim **3**, wherein said aqueous solvent mixture comprises iodine in an amount of about 0.02 M.

5. A method in accordance with claim **3**, wherein said nucleotides have the formula:



wherein

B is a member selected from the group consisting of natural or unnatural adenine, natural or unnatural guanine, natural or unnatural thymine, natural or unnatural cytosine, and natural or unnatural uracil;

R is a member selected from the group consisting of hydrogen, hydroxy, protected hydroxy, halogen and alkoxy;

P is a phosphoramidite group; and

PG is a photoremoveable protected group. .

6. A method in accordance with claim **5**, wherein B is selected from the group consisting of adenine, guanine, cytosine and thymine and R is hydrogen.

7. A method in accordance with claim **5**, wherein said array comprises at least 10 different nucleic acids.

8. A method in accordance with claim **5**, wherein said array comprises at least 100 different nucleic acids.

9. A method in accordance with claim **5**, wherein said array comprises at least 1000 different nucleic acids.

10. A method in accordance with claim **5**, wherein said array comprises at least 10,000 different nucleic acids.

11. A method in accordance with claim **5**, wherein said array comprises at least 100,000 different nucleic acids.

12. A method in accordance with claim **5**, wherein each different nucleic acid is in a region having an area of less than about 1 cm^2.

13. A method in accordance with claim **5**, wherein each different nucleic acid is in a region having an area of less than about 1 mm^2.

14. A method in accordance with claim **5**, wherein said solution is about 0.02 M iodine in a mixture of water, pyridine and THF.

15. A method in accordance with claim **5**, wherein B is selected from the group consisting of adenine, guanine, cytosine and thymine, R is hydrogen, and said solution is about 0.02 M iodine in a mixture of water, pyridine and THF.

16. A method in accordance with claim **5**, wherein B is selected from the group consisting of adenine, guanine, cytosine and thymine, R is hydrogen, PG is MeNPOC and said solution is about 0.02 M iodine in a mixture of water, pyridine and THF.

17. A method in accordance with claim **5**, wherein B is selected from the group consisting of adenine, guanine, cytosine and thymine, R is hydrogen, PG is

3 MeNPOC, P is $-P(OCH_2CH_2CN)N(iPr)_2$ and said solution is about 0.02 M iodine in a
4 mixture of water, pyridine and THF.

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